

--ABSTRACT OF THE DISCLOSURE

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A process for upgrading titaniferous material by removal of impurities contained in the material, especially radionuclides. The process involves heating the titaniferous material to a temperature of less than 1300°C to form a solid titaniferous phase and an impurity-containing liquid oxide phase in the presence of a material that promotes the formation of the liquid oxide phase. The solid titaniferous phase and liquid oxide phase are cooled at a rate that maintains the separate impurity-containing phase in an amorphous state, which can be leached with an acid or alkali to remove the impurities. Materials that promote the formation of the desired liquid oxide phase includes compounds of alkali metals and boron, for example borax, caustic soda, soda ash and silica.--